CLIMATE ACTION PLAN

TOWN OF ROSS

NOVEMBER 2010

CREDITS AND ACKNOWLEDGEMENTS

Town Council

Christopher Martin, Mayor
Carla Small, Mayor Pro Tempore
Scot Hunter
Rupert Russell
Richard Strauss

Town Staff

Gary Broad, Town Manager
Mel Jarjoura, Public Works Director
Jim Reis, Police Chief
Elise Semonian, Senior Planner
Tom Vallee, Fire Chief

Marin Climate & Energy Partnership

Christine O'Rourke, Sustainability Coordinator

Graphic Design

Elissa Park

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TABLE OF CONTENTS

1. Introduction

- 1.1 Purpose of the Climate Action Plan 1
- 1.2 Relationship to the General Plan 2
- 1.3 Climate Change Background 3
- 1.4 Climate Change Mitigation Activities in Ross 5
- 1.5 Regulation of Climate Change – Federal, State and Regional Levels 6

2. Ross' Greenhouse Gas Emissions

- 2.1 Ross' Profile 10
- 2.2 2005 Greenhouse Gas Emissions Inventory 11
- 2.3 Forecast for 2020 Emissions 13
- 2.4 Greenhouse Gas Emissions Reduction Target 14

3. Actions to Reduce Greenhouse Gas Emissions

- 3.1 Summary of Greenhouse Gas Reduction Strategies 15
- 3.2 Natural Systems, Sequestration and Carbon Offset 16
- 3.3 Land Use and Transportation 18
- 3.4 Green Building, Energy Efficiency and Renewable Energy 21
- 3.5 Green Purchasing 23
- 3.6 Waste Reduction, Recycling and Zero Waste 24
- 3.7 Water and Wastewater 26
- 3.8 State Actions 28

4. Plan Implementation 30

APPENDIX

Data Sources, Assumptions and Calculations A-1

LIST OF FIGURES AND TABLES

FIGURES

Figure 1: The Greenhouse Effect 3
Figure 2: Inundation Effect of 16-Inch Sea Level Rise 4
Figure 3: Ecological Footprint Comparison 8
Figure 4: Marin County Emissions by Sector (2005) 9
Figure 5: Marin County Emissions 1990-2005 9
Figure 6: 2005 Community CO2e Emissions 11
Figure 7: Emissions Reduction Target 14

TABLES

Table 1: 2005 Government Operations Emissions by Sector 12
Table 2: Forecast for 2020 Emissions 13
Table 3: Mitigation Measures for Community Emissions 15
Table 4: Mitigation Measures for Government Operations Emissions 15
Table 5: Section 3.2 Community Mitigation Measures 16
Table 6: Section 3.2 Government Operations Mitigation Measures 16
Table 7: Section 3.3 Community Mitigation Measures 18
Table 8: Section 3.3 Government Operations Mitigation Measures 18
Table 9: Section 3.4 Community Mitigation Measures 21
Table 10: Section 3.4 Government Operations Mitigation Measures 21
Table 11: Section 3.5 Government Operations Mitigation Measures 23
Table 12: Section 3.6 Community Mitigation Measures 24
Table 13: Section 3.6 Government Operations Mitigation Measures 24
Table 14: Section 3.7 Community Mitigation Measure 26
Table 15: Section 3.8 Community Mitigation Measures 28
Table 16: Section 3.8 Government Operations Mitigation Measures 28

1. INTRODUCTION

1.1 Purpose of the Climate Action Plan

The Town of Ross understands that climate change has the potential to significantly affect Ross' residents and businesses, as well as other communities around the world. The Town also recognizes that local governments play a strong role in reducing greenhouse gas emissions and mitigating the potential impacts of climate change.

The purpose of this Climate Action Plan is to compile existing and potential strategies (i.e., actions, projects, and programs) that the Town's government operations and the community can take to address climate change. It provides a brief background on what climate change is and its potential impacts, but focuses on the efforts Ross can take to reduce its greenhouse gas emissions and mitigate, to the extent feasible at the local level, the potential impacts of climate change.

Through actions outlined in this plan, such as increasing energy efficiency in buildings, encouraging less dependence on the automobile, and using clean, renewable energy sources, the community can experience lower energy bills, improved air quality, reduced emissions, and an enhanced quality of life. The Town's preparation of a 2005 Greenhouse Gas Emissions Inventory and this Climate Action Plan are the beginning of an ongoing planning process that includes assessing, planning, mitigating and adapting to climate change.

Specifically, this Plan does the following:

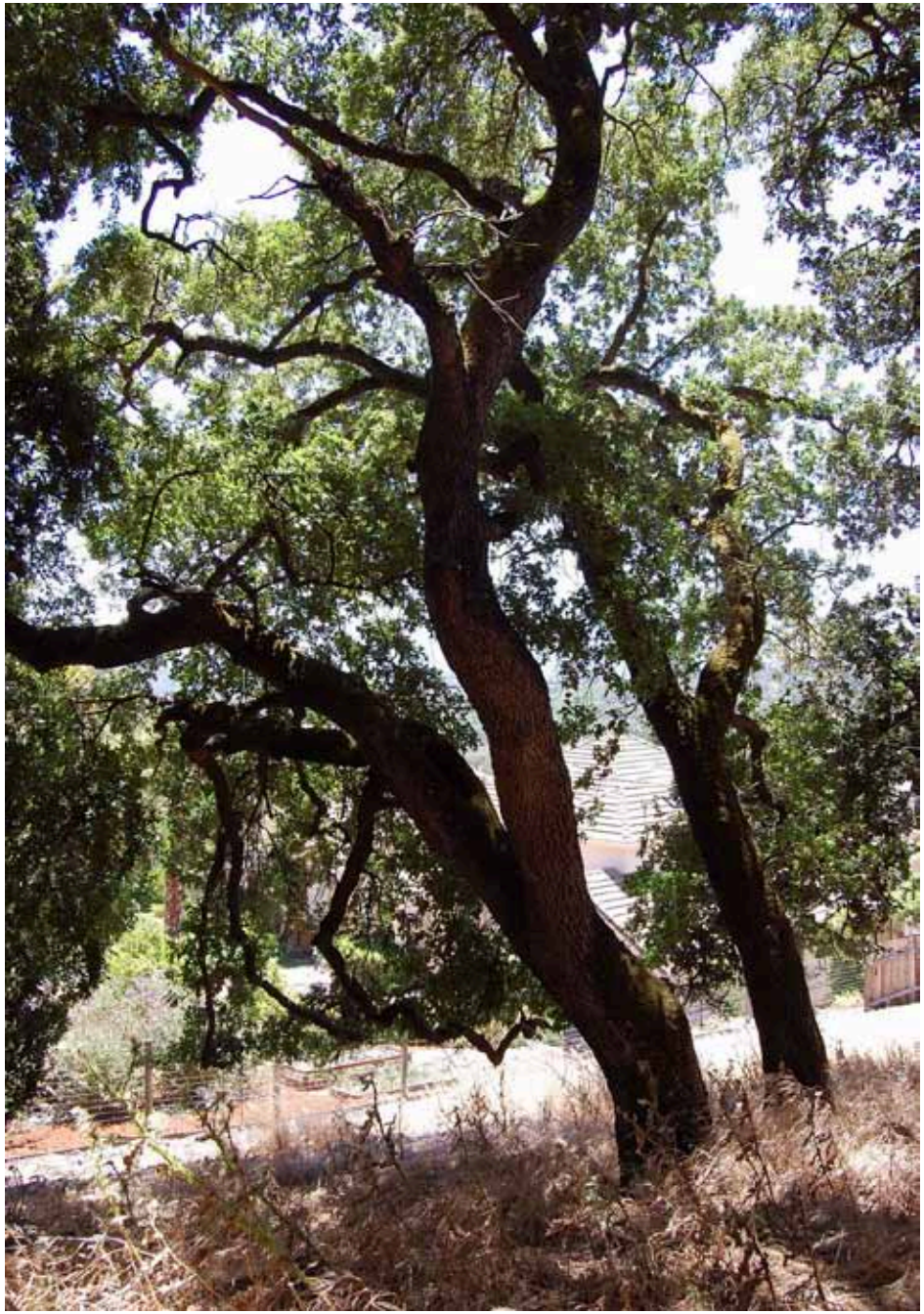
- Summarizes the various regulations at the federal, state, and regional levels.
- Incorporates the Town's 2005 Greenhouse Gas Emission Inventory, which identified sources of greenhouse gas emissions generated by both the community and the Town's government operations.
- Estimates how these emissions may change over time and establishes a target to reduce greenhouse gas emissions to 15% below 2005 levels by 2020.
- Provides natural system, energy use, transportation, land use, green purchasing, waste and water use strategies necessary to minimize Ross' impacts on climate change and meet the established greenhouse gas emission reduction target.

1.2 Relationship to the General Plan

In its General Plan 2007-2025, the Town adopted a number of sustainable building and community policies to reduce resource consumption and improve energy efficiency, including:

1. Requiring large houses to limit the energy usage to that of a more moderately-sized house as established in design guidelines.
2. Encouraging affordable workforce housing and a development pattern that encourages people to walk.
3. Using green materials and resources.
4. Conserving water, especially in landscaping.
5. Encouraging transportation alternatives to the private automobile.
6. Increasing the use of renewable energy sources, including solar energy.
7. Recycling building materials.
8. Reducing building footprints.

Though both the General Plan and the Climate Action Plan are intended as long-range plans, the Climate Action Plan may be updated on a more regular basis to add and amend strategies as new information, policy guidance, and regulations regarding climate change evolve and new technologies to address it are developed. It is intended that future updates to the Ross General Plan will integrate and reference this plan, instead of including the plan in the General Plan itself.



1.3 Climate Change Background

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping infrared radiation (heat), a phenomenon known as the greenhouse effect. Significant evidence suggests that human activities are increasing the concentration of these gases (known as "greenhouse gases" or GHG) in the atmosphere, causing a rise in global average surface temperature and consequent global climate change. The greenhouse gases include carbon dioxide, methane, nitrous oxide, halocarbons, ozone, and water vapor. Each one has a different degree of impact on climate change. To facilitate comparison across different emission sources with mixed and varied compositions of several GHG, the term "carbon dioxide equivalent" or CO2e is used. One metric ton of CO2e may consist of any combination of GHG, and has the equivalent Global Warming Potential (GWP) as one metric ton of carbon dioxide (CO2). According to EPA's April 2009, "Inventory of U.S. Greenhouse Gas Emissions," the majority of GHG emissions comes from fossil fuel combustion, which in turn is used for electricity, transportation, industry, and heating, etc.

Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperatures to rise, which affects local and global climate patterns. These changes in climate are forecasted to manifest themselves in a number of ways that might impact Ross as well as other changes to local and regional weather patterns and species migration.

According to a 2006 Summary Report from the California Climate Change Center, global warming could significantly impact California water and forest resources. The Center's 2006 Summary Report noted the following findings and potential risks to California[1]:

- Precipitation is the most important hydrologic variable and most difficult to forecast.
- Warming raises the elevation of snow levels with reduced spring snowmelt and more winter runoff.
- Less snowmelt runoff means lower early summer storage at major foothill reservoirs with less hydroelectric power production.
- Higher temperatures and reduced snowmelt compounds the problem of providing suitable cold-water habitat for salmon species.
- Rising sea levels would adversely affect many coastal marshes and wildlife reserves.
- Higher temperatures increase the demand for water by plants.
- Climate change in California will result in a higher frequency of large damaging fires.
- Regional climates that are hotter and drier will result in increased pest and insect epidemics within California's forests.

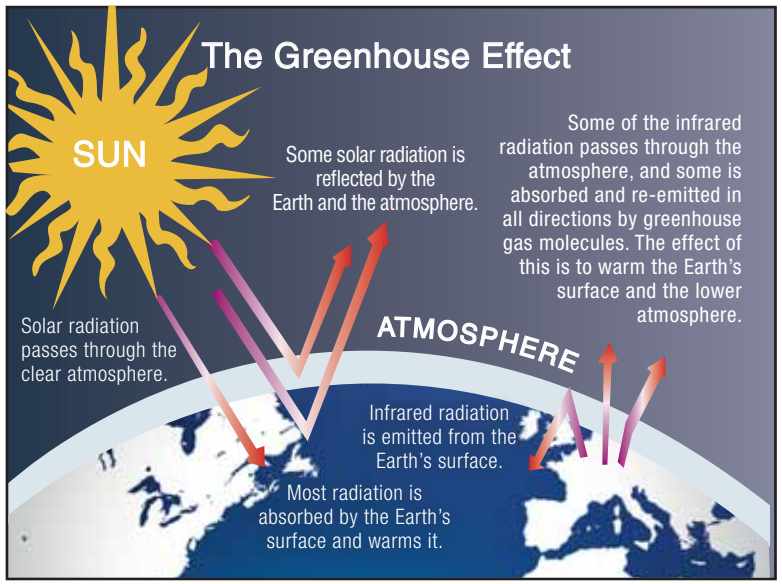

The Greenhouse Effect
SUN
Some solar radiation is reflected by the Earth and the atmosphere.
Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.
Solar radiation passes through the clear atmosphere.
ATMOSPHERE
Infrared radiation is emitted from the Earth's surface.
Most radiation is absorbed by the Earth's surface and warms it.

Figure 1: The Greenhouse Effect

1 A Summary Report from: California Climate Change Center. Our Changing Climate: Assessing the Risks to California. Document No. CEC-500-2006-077. July 2006. http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF, accessed 3/22/10.

Sea Level Rise

Because of scientific uncertainties, it is difficult to predict with a high degree of accuracy the sea level rise that will impact Marin County residents. The San Francisco Bay Conservation and Development Commission's (BCDC) most recent assessment assumes a 1.8° to 5.4° F (1° to 3° C) rise in global temperature over the next century and a corresponding sea level rise in San Francisco Bay of 16 inches by mid-century and 55 inches by 2100. Sea level rise of this magnitude would have dramatic impacts on residences, businesses, schools, and public infrastructure located near the shoreline. Inundation maps created by BCDC (see Figure 2) integrate GIS data from the USGS and sea level rise projections to assess the vulnerability of Bay Area communities to different level rise scenarios. A 16-inch rise in sea level would result in the flooding of an estimated 180,000 acres of shoreline. A 55-inch rise in sea level would flood over 213,000 acres of shoreline, putting billions of dollars of private and public development at risk. Changes in climate and sea level could cause an increase in storm activity, storm surges, and even greater flooding.

Figure 2: Inundation Effect of 16-Inch Sea Level Rise

The areas in blue identify the land area that is subject to inundation from a 16-inch rise in sea level.

SOURCE:
http://www.bcdc.ca.gov/planning/climate_change/maps/16/cbay_north.pdf; Inundation data from Knowles, 2008. Aerial imagery is NAIP 2005 data. Accessed 3/30/10.
DISCLAIMER: Inundation data does not account for existing shoreline protection or wave activity. These maps are for informational purposes only.

2 San Francisco Bay Conservation and Development Commission Draft Staff Report, "Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline," April 7, 2009, http://www.bcdc.ca.gov/proposed_bay_plan/bp_1-08_cc_draft.pdf, accessed 3/30/10.

1.4 Climate Change Mitigation Activities in Ross

The Town has established its commitment to reducing its contribution to climate change and preparing for the potential impacts from climate change through pursuit of strategic partnerships and early actions. Most notably, the Town signed the U.S. Conference of Mayors Climate Protection Agreement, committed to the Marin Climate and Energy Partnership, completed a Greenhouse Gas Inventory of 2005 emissions, and set a target to reduce greenhouse gas emissions by 15% below 2005 levels by 2020.

In May of 2008, the Ross Mayor signed the U.S. Mayors Climate Protection Agreement, which commits the Town to strive to meet Kyoto Protocol emissions reduction targets and support state and federal greenhouse gas emission reduction legislation. The Town plans to achieve this by adopting land-use policies that create a walkable community, promoting alternative transportation options and energy use, increasing energy efficiency and recycling efforts, and encouraging sustainable building practices.

The Town has taken a number of initiatives in recent years to reduce greenhouse gas emissions, including:

- Adopted sustainable building and community policies to reduce resource consumption and improve energy efficiency in its General Plan 2007-2025.
- Constructed the Shady Lane Pathway and the Sir Francis Drake Boulevard Pathway to encourage children to walk/bike to school and residents to walk/bike to downtown rather than drive.
- Implemented other Safe Routes to School recommendations, including restriping of Laurel Grove Ave. and intersection and crosswalk improvements throughout Town.
- Improved pedestrian safety in the redesign of the Lagunitas Road Bridge.
- Pursued funding for pedestrian and cyclist improvements on Bolinas Avenue and at the intersection of Sir Francis Drake Boulevard and Lagunitas Road.
- Adopted various incentives to encourage solar energy installation. Zoning laws were amended to allow solar energy panels within side and rear setbacks on existing rooftops and to exempt panels from lot coverage calculations; these changes enable more homeowners to apply for solar energy system permits without the time and cost of requesting a variance. The Town also waives all building permit fees for certain solar energy systems, reduces variance fees for solar energy systems by one half, and offers a rebate of up to $1,000 on building permit fees for projects that include solar energy components.
- Brought the Famers Market to Ross in 2008.
- Adopted housing policies and programs that encourage new housing to be built along the Sir Francis Drake corridor and near job centers.
- Became the first community in Marin County to purchase fuel-efficient patrol cars. The new Dodge Chargers use only four cylinders while idling, but can switch to six cylinders in the “pursuit ready” mode. Chief Reis plans to phase these fuel-efficient models into the police fleet as vehicles are replaced. Two of the Town’s six patrol cars are currently Dodge Chargers.
- Adopted the Town of Ross 2010 Bicycle and Pedestrian Plan and installed bicycle route signs on Marin County bike routes in Town.
- Adopted a Complete Streets resolution and set a goal to increase walking and bicycling trips to 20% of all local trips by 2020.
- Adopted a resolution supporting development of a Central Marin Sanitation Agency “Food to Energy” initiative which would create electricity from methane gas generated by food waste.
- Adopted wood-burning fireplace regulations to protect air quality by extending Bay Air Quality Management District regulations to outdoor fireplaces.

1.5 Regulation of Climate Change – Federal, State and Regional Levels

Federal Climate Policy

Currently, there is no federal mandate for greenhouse gas emission reporting or reduction in the United States. Efforts, however, are underway in Congress to develop and enact comprehensive climate and energy legislation. Senator Boxer, Chair of the Environment and Public Works Committee, has stated that AB 32 goals and strategies may be a viable starting point for federal legislation.

State Climate Policy

California produces roughly 1.4 percent of the world's and 6.2 percent of the total U.S. greenhouse gases (GHG). The State of California has taken the lead in setting specific targets for reducing greenhouse gas emissions from the burning of fossil fuels in both power plants and vehicles through the following legislation:

California Solar Initiative Program, 2006. Comprehensive $2.8 billion program that provides incentives toward residential and commercial solar development over 11 years.

Senate Bill 1078 Sher, 2002. Established a Renewable Portfolio Standard requiring electricity providers to increase purchases of renewable energy resources by 1% per year until they have attained a portfolio of 20% renewable resources.

Executive Order S-21-09. In September 2009, California Governor Arnold Schwarzenegger signed an executive order directing the State's Air Resources Board to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. The RPS will apply to investor-owned utilities, publicly-owned utilities, direct access providers, and community choice aggregators, including Marin Energy Authority.

Assembly Bill 1493 Pavley, 2002. Requires the California Air Resources Board (CARB) to develop and adopt regulations that achieve the maximum feasible reduction of greenhouse gasses from vehicles primarily used for non-commercial transportation by January 2005. In 2009, CARB adopted final regulations that are expected to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016.

Senate Bill 1771 Sher, 2000. Requires the California Energy Commission (CEC) to prepare an inventory of the State's greenhouse gas emissions, to study data on global climate change, and to provide government agencies and businesses with information on the costs and methods for reducing greenhouse gases. Also establishes the California Climate Action Registry to serve as a certifying agency for companies and local governments to quantify and register their greenhouse gas emissions for possible future trading systems.

Assembly Bill 32 Nuñez & Pavley, 2006. Also known as The Global Warming Solutions Act of 2006, institutes a mandatory limit on greenhouse gas pollution and requires a reduction in emissions in California to 1990 levels by the year 2020. The bill also directs the California Air Resources Board (CARB) to establish a mandatory reporting system to track and monitor emission levels and requires CARB to develop various compliance options and enforcement mechanisms.

Senate Bill 375 Steinberg, 2008. Will assign a greenhouse gas reduction target for car and light truck emissions for each region in the State represented by a metropolitan planning organization (MPO) that is to be addressed with a Sustainable Communities Strategy (SCS). Also touches on planning for transportation, housing and the environment and requires Alternative Planning Strategy documents where a SCS will not achieve the GHG reduction targets.

The most significant of these initiatives are AB 32 and SB 375; the first requires California to reduce its GHG to 1990 levels by 2020, and the second begins to tie GHG reductions to land use. In 2007, the California Air Resources Board (CARB) conducted an emissions inventory for the state to identify emissions levels in 1990 that figure 427 million metric tons of carbon dioxide equivalent. The inventory revealed that transportation was the largest single sector (35% of the state's total 1990 emissions), followed by industrial emissions (24%), imported electricity (14%), in-state electricity generation (11%), residential use (7%), agriculture (5%), and commercial use (3%).[3]

Preliminary estimates indicate that California's 2020 emission projections could be 600 million tons of CO2e if no actions are taken to reduce GHG. This means that California must prevent 173 million tons of CO2e from being emitted by 2020 in order to meet the 1990 levels as required by AB 32.

CARB is responsible for monitoring and reducing GHG emissions set forth in AB 32, and is, therefore, coordinating statewide efforts. In December 2008, CARB adopted a Scoping Plan that outlines the actions required for California to reach its 2020 emission target. The actions include a broad set of clean energy, clean transportation, and efficiency standards.

In 2009, CARB identified and implemented nine discrete early action measures including regulations affecting landfills, motor vehicle fuels, refrigerants in cars, tire pressure, port operations and consumer products. Additional reduction measures to meet the 2020 target will be adopted by early 2011.

Key strategies identified in the Scoping Plan that are best developed and supported by local governments in achieving the climate protection and emission reduction goals include:

- Transportation and community design
- Local and regional emission targets
- Recycling and waste reduction
- Clean energy
- Green buildings
- Water

The CARB Climate Change Scoping Plan "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020." [4] However, CARB does not yet require cities to adopt climate action plans as part of AB32 implementation efforts.

3 California Air Resources Board, "Air board passes two major building blocks in state's effort to fight global warming," December 7, 2007, http://www.arb.ca.gov/newsrel/nr120607.htm, accessed 10/26/10.
4 California Air Resources Board, "Climate Change Scoping Plan," December 2008, p. 27, http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf, accessed 3/31/10.

Marin County Climate Policy

Underpinning sustainability and climate change efforts in Marin County is the recognition that Marin residents consume resources at a far greater rate than most industrialized nations, and that the worldwide use of resources is exceeding the earth's capacity to renew them. One way to measure the use of natural resources against the planet's actual biocapacity and ability to renew those resources is the "ecological footprint." It can be calculated for individuals, regions, countries, or the entire earth and is expressed as the number of global acres (acres with world average biological productivity) that it takes to support one person. As Figure 3 shows, the average American uses 24 global acres per capita, while the average Marin resident requires 27 global acres. Other western democracies, such as France, Germany, and Italy, have footprints of 13, 12, and 9.5 global acres per person, respectively. According to the Global Footprint network, if every person lived the lifestyle of one American, we would need five planets to sustain us.

In 2006, Marin County developed a strategic plan to reduce annual GHG emissions to 15% below 1990 levels by 2020. In 2007, the County re-inventoried their greenhouse gas emissions. Figures 4 and 5 show the distribution of County-wide GHG emissions by sector in 2005 and emission trends between 1990 and 2005. Total countywide greenhouse gas emissions increased by approximately 6% between 1990 and 2005, from 3,005,674 to 3,188,522 tons CO2e.[5] This 6% rate of increase can be used as a proxy to estimate the increase in Ross' emissions between 1990 and 2005, since actual data is unavailable.

While the County has taken important steps to reduce greenhouse gas emissions, a large portion of Marin County is operated and governed by the eleven local jurisdictions and numerous special districts. It is therefore important that the municipalities, such as Ross, participate in developing local emission reduction measures and policies.

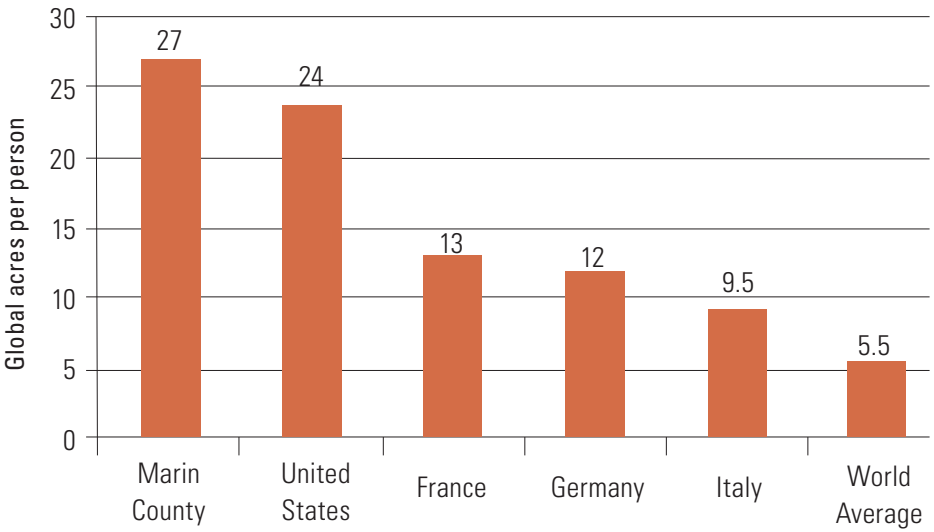


Figure 3: Ecological Footprint Comparison

Source: Redefining Progress, Sustainable Sonoma County, Worldwide Fund for Nature, as quoted in the Marin Countywide Plan, adopted November 6, 2007.

5 "Marin County Re-Inventory of Greenhouse Gas Emissions," Marin County Community Development Agency, September 2007.

Coordinated Multi-Jurisdictional Approach: Marin Climate and Energy Partnership

Created in 2007, the mission of the Marin Climate & Energy Partnership (MCEP) is to reduce greenhouse gas emission levels to the targets of Marin County and local municipalities, consistent with the standards set by AB32. All eleven Marin cities and towns, the Marin County Community Development Agency, the Transportation Authority of Marin, the Marin Municipal Water District, and the Marin General Services Authority are partner members.

One of MCEP's first projects was to work with ICLEI – Local Governments for Sustainability, a nonprofit organization, to develop greenhouse gas emissions inventories for the partner jurisdictions. With Bay Area Air Quality Management District grant funding, MCEP also worked on programs related to reducing energy use in municipal buildings, establishing a green purchasing collaborative, reducing energy use in residential and commercial buildings, reducing emissions from private and municipal vehicles, and reducing energy use and emissions from waste.

In 2009, MCEP developed a green building strategic plan and green building policies which resulted in the Marin Green BERST model ordinance. The Marin Community Foundation provided funding for this effort, as well as funds to develop climate action plans for six partner jurisdictions. Partner members have agreed to use their adopted climate action plans to identify mutual measures to reduce community-wide greenhouse gas emissions and develop policies and programs to support priority measures. The Town has worked closely with the Marin Climate and Energy Partnership to complete this climate action plan, and to implement a coordinated approach to local and regional emissions reduction targets and climate action planning goals.

Figure 4: Marin County Emissions by Sector (2005)

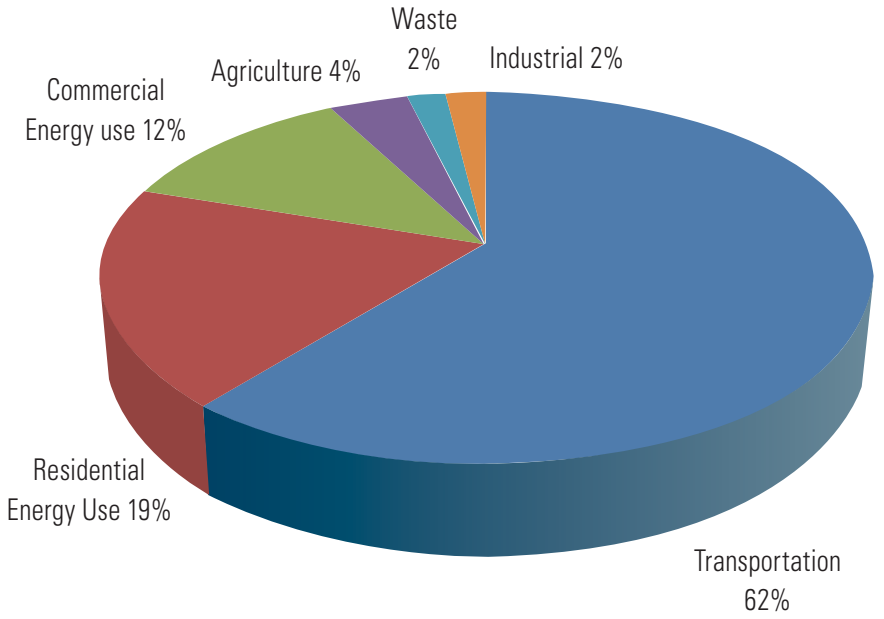
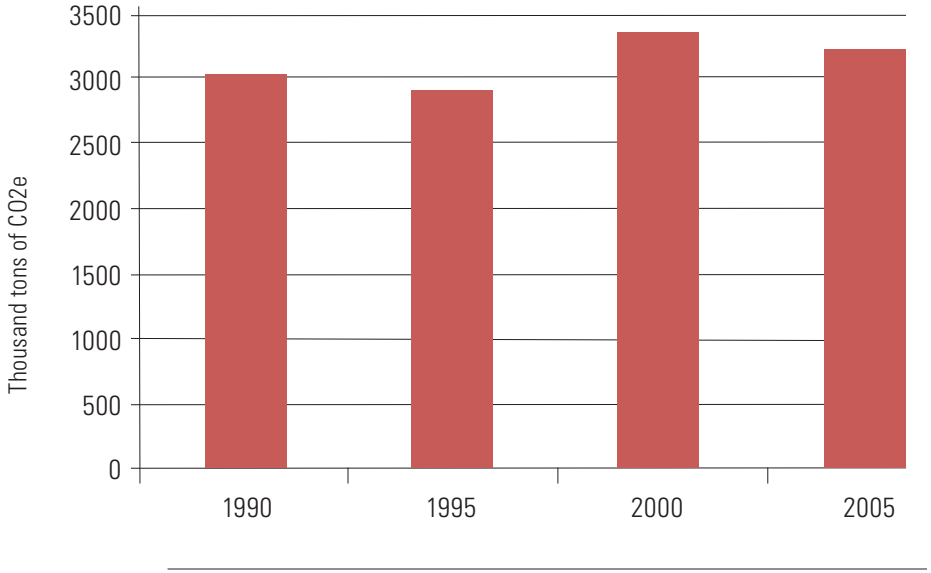


Figure 5: Marin County Emissions 1990-2005



2. ROSS' GREENHOUSE GAS EMISSIONS

2.1 Ross' Profile

Located in Marin County approximately fifteen miles north of the Golden Gate Bridge, Ross is a small town with a land area of 1.6 square miles and an estimated current population of 2,422.[6] Primarily a residential community of single-family homes, Ross has a small percentage of land devoted to multi-family development and commercial uses. While many services are available in Ross, including a public K-8 school and recreational facilities, residents visit adjacent communities to access additional services and commute to jobs.

Sir Francis Drake Boulevard, a principal arterial roadway, bisects the west and east side of Ross. The road connects Highway 101 to communities in the western region of Marin County, and is heavily used by commuters and others who do not live or work in Ross. Walking is a viable way to get around the community, especially on the flatter areas located near the downtown area, and the Town has invested in building new pathways and improving pedestrian safety. There are two signed county bike routes and a Class 1 multi-use path within the Town, which provide access to recreational areas, the downtown, the post office, and schools. Public transit is limited within Ross, with bus stops located on Sir Francis Drake Boulevard. Ferry service is located in Larkspur and provides a convenient way for residents to commute to San Francisco.

6 State of California, Department of Finance, E-1 Population Estimates for Cities, Counties and the State with Annual Percent Change — January 1, 2009 and 2010, May 2010.

2.2 2005 Greenhouse Gas Emissions Inventory

The first step toward reducing greenhouse gas emissions is to identify sources of emissions and establish baseline levels. This information can then inform the selection of a reduction target and possible reduction measures to be included in the climate action plan. In 2009, the Town prepared a report that inventories greenhouse gas emissions from the Ross community and, as a subset of that analysis, local government operations. The report provides a detailed understanding of where the highest emissions are coming from, and, therefore, where the greatest opportunities for emissions reductions lie. The inventory also establishes a baseline emission inventory against which to measure future progress.

The inventory analyzes four primary sectors of community emissions: residential, commercial, transportation, and waste. Residential and commercial emissions come primarily from the on-site combustion of natural gas and the off-site generation of electricity for heating, cooling, lighting, cooking, and the operation of appliances and electrical devices. Transportation emissions result from the combustion of diesel and gasoline on roadways within the Town of Ross. Waste emissions come from the decomposition of waste generated by residents and businesses in landfills outside the Town limits.

Government operations emissions are categorized according to six primary sectors: buildings; lighting, streetlights and traffic signals; water delivery facilities such as irrigation systems and water pumps; vehicle fleet, including police and public works vehicles; government-generated solid waste, including public trash cans and street sweepings; and employee commute.

The inventory utilizes 2005 as the baseline year, as this year is increasingly becoming the standard for such inventories. Due to lack of city-specific data, the 1990 baseline year utilized by the State of California is usually too difficult for most local governments to meet and would not produce the most accurate inventory. According to the Association of Bay Area Governments (ABAG) Projections 2009, Ross' population was 2,400 in 2005, and there were approximately 770 households. Included as an indicator of commercial activity, the number of jobs within Ross in 2005 was 860.

Community Inventory Results

In 2005, the Ross community emitted approximately 17,209 metric tons of CO2e. As shown in Figure 6 below, electricity and natural gas use in the Residential sector was by far the largest source of emissions, generating approximately 8,239 metric tons of CO2e, or 47.9% of total 2005 emissions. Transportation sector emissions, totaling 7,268 metric tons CO2e and representing 42.2% of total emissions, are the result of diesel and gasoline combustion in vehicles traveling on local roads. The Commercial/ Industrial sector, the third greatest source of 2005 emissions, generated 1,102 metric tons CO2e, or 6.4% of the total. The remaining 3.5% (600 metric tons) are the estimated future methane emissions that will result from the decomposition of waste that was generated by the Ross community during 2005.

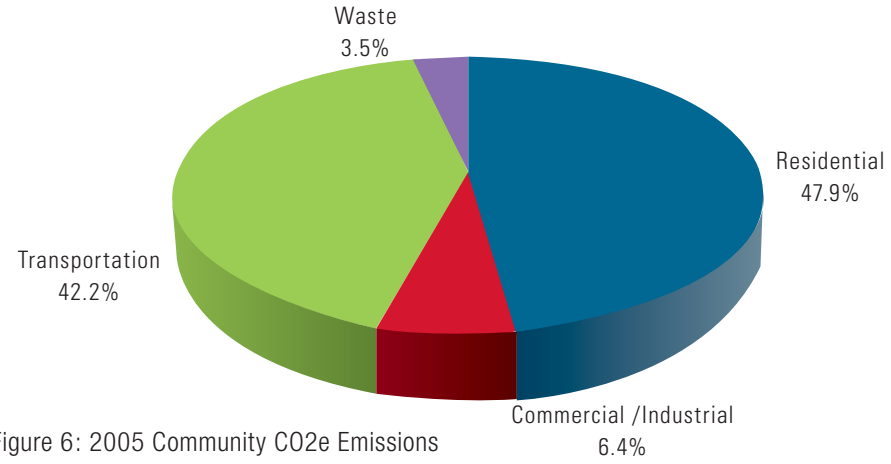


Figure 6: 2005 Community CO2e Emissions

Government Operations Inventory Results

In 2005, Ross government operations emitted approximately 260 metric tons of CO2e.[7] As shown in Table 1, the Vehicle Fleet sector was the largest emitter (38.4%) in 2005. Emissions from the Employee Commute sector produced the second highest quantity of emissions, resulting in 34% of total CO2e; and the Buildings sector produced 14.3% of total emissions. The remainder of emissions came from the Lighting sector (9.7%), the Waste sector (3.6%), and the Water sector (0.1%). Emissions from government operations produced approximately 1.5% of total community emissions.

Table 1: 2005 Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO2e)	Greenhouse Gas Emissions (% CO2e)	Energy Equivalent (million Btu)	Cost* ($)	% of Total Cost
Buildings	37	14.3%	601	$15,763	20.6%
Vehicle Fleet	100	38.4%	1,374	$27,824	36.4%
Lighting	25	9.7%	368	$32,465	42.5%
Water	0.2	0.1%	3	$295	0.4%
Waste	9	3.6%	0	n/a	0.0%
Employee Commute	88	34.0%	1,140	n/a	0.0%
TOTAL	260	100.0%	3,485	$76,346	100.0%

* Energy cost for electricity, natural gas, gasoline and diesel in 2005.

7 This number includes all Scope 1 emissions from the on-site combustion of fuels in facilities and vehicles, Scope 2 emissions from the purchase of electricity, and Scope 3 emissions from waste generated by local government operations and emissions associated with employee commute patterns.

2.3 Forecast for 2020 Emissions

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, this plan includes an emissions forecast for the year 2020. Under a business-as-usual scenario, Ross' emissions will grow by approximately 5.4% by the year 2020, from 17,209 to 18,146 metric tons CO2e. Table 2 shows the result of the forecast by sector. A variety of different reports and projections were used to create the emissions forecast, as profiled below.

For the residential and waste sectors, population projections for Ross, as released by the Association of Bay Area Governments (ABAG) in 2009, were used to estimate average annual compound growth in energy demand. ABAG estimates the Ross population will remain constant at 2,400 between 2005 and 2020.

Analysis contained within *California Energy Demand 2008-2018: Staff Revised Forecast*[8], a report by the California Energy Commission (CEC), shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the Commercial Sector. ABAG projects job growth will increase from 860 jobs in 2005 to 890 in 2020. Using this growth projection of 30 jobs, it was calculated that the average annual growth in energy use in the commercial sector between 2005 and 2020 would be 0.23%.

For the transportation sector, the Metropolitan Transportation Commission (MTC) projects that county-wide vehicle miles traveled in Marin County will increase at a rate of 0.78% a year between 2006 and 2020, or approximately 12.4% between 2005 and 2020.[9]

As no significant expansion of government services is expected over the next ten years, government operations emissions are projected to remain consistent with 2005 levels under a business as usual scenario.

Table 2: Forecast for 2020 Emissions

Sector	2005 (metric tons CO2e)	2020 (metric tons CO2e)	Annual Growth Rate	Percent Change from 2005 to 2020
Residential	8,239	8,239	0.00%	0.0%
Commercial	1,102	1,140	0.23%	3.5%
Transportation	7,268	8,166	0.78%	12.4%
Waste	600	600	0.00%	0.0%
TOTAL	12,654	13,547	0.46%	7.1%

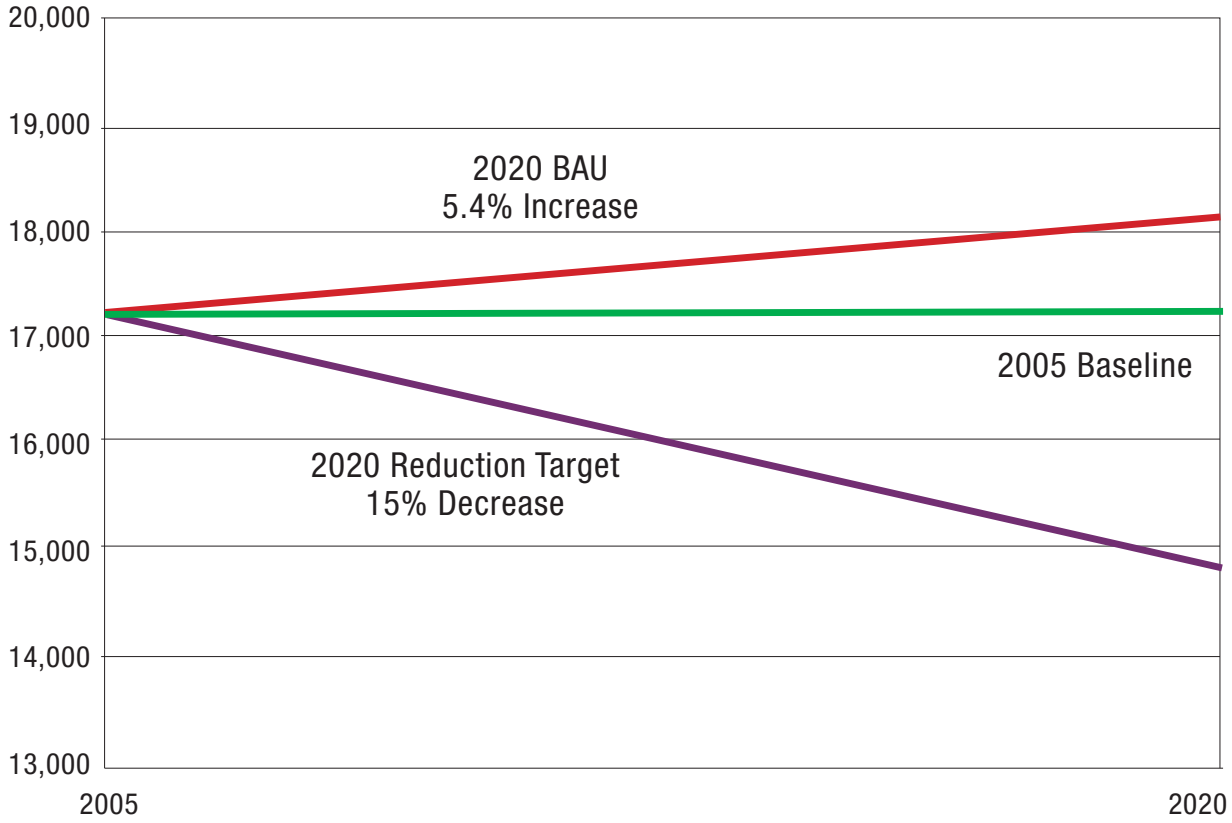
* Energy cost for electricity, natural gas, gasoline and diesel in 2005.

8 http://www.energy.ca.gov/2007publications/CEC-200-2007-015/CEC-200-2007-015-SF2.PDF
9 Transportation 2035 Plan for the San Francisco Bay Area - Travel Forecasts Data Summary

2.4 Greenhouse Gas Emissions Reduction Target

This Climate Action Plan utilizes an emissions reduction target of 15% below 2005 levels by 2020, which is consistent with the State's direction to local governments in the AB 32 Scoping Plan.[10] Figure 7 provides a comparison of the business-as-usual forecast for 2020 to the 2005 baseline year and the 15% reduction target. Figure 7 is also a depiction of Ross' challenge in attempting to meet its reduction targets. Emissions will continue to increase along the business-as-usual scenario while reduction efforts are initiated. Achieving the target is therefore more than a 15% decrease – rather, it is a 19.4% reduction from projected 2020 emissions levels for the Ross community.

Figure 7: Emissions Reduction Target



10 California Air Resources Board, "Climate Change Scoping Plan," December 2008, p. 27, http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf, accessed 3/31/10.

3. ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

3.1 Summary of Greenhouse Gas Reduction Strategies

The mitigation measures presented in this chapter, as summarized in the tables below, achieve greenhouse gas emissions reductions in the community of 2,538 metric tons CO2e or approximately 15% below the 2005 baseline. When state reductions are added, emissions in Ross would be approximately 27% below 2005 levels -- enough to allow the Town to surpass a reduction target of 15% below the 2005 baseline by 2020.

Within government operations, the Town could achieve reductions of 50 metric tons CO2e, or nearly 21% below 2005 levels by implementing the specific, measurable actions listed in the following sections. A wide range of programs that exceed the Town's reduction goal have been included to allow for the consideration and prioritization of each program, based on its estimated cost, annual savings, and GHG reduction benefit, during the consideration of new programs, development projects, and funding opportunities. State actions would reduce emissions by another 16%, and programs to offset emissions could reduce emissions by an additional 49%.

Table 3: Mitigation Measures for Community Emissions

Section		GHG Reductions (Metric Tons)
3.2	Natural Systems, Sequestration and Carbon Offsets	416
3.3	Land Use and Transportation	669
3.4	Green Building, Energy Efficiency and Renewable Energy	1,036
3.6	Waste Reduction, Recycling and Zero Waste	241
3.7	Water and Wastewater	177
	SUBTOTAL	2,538
	% below 2005 levels	14.7%
3.8	State Actions	2,181
	% below 2005 levels	12.7%
TOTAL		4,719
Cumulative % below 2005 levels (Goal: 19.4%)		27.4%

Table 4: Mitigation Measures for Government Operations Emissions

Section		GHG Reductions (Metric Tons)
3.2	Natural Systems and Sequestration (excluding Carbon Offsets)	3.8
3.3	Land Use and Transportation	31.6
3.4	Green Building, Energy Efficiency and Renewable Energy	12.0
3.5	Green Purchasing	0.3
3.6	Waste Reduction, Recycling and Zero Waste	2.3
	SUBTOTAL	50.0
	% below 2005 levels	21.1%
3.8	State Actions	38.1
	% below 2005 levels	16.1%
3.2	Carbon Offsets	116.7
	% below 2005 levels	49.2%
TOTAL		205
Cumulative % below 2005 levels (Goal: 15%)		86.4%

3.2 Natural Systems, Sequestration and Carbon Offsets

The natural environment has been extensively altered by human civilization, often with little consideration for how natural systems function, depriving us of the important benefits they offer. Clearing and draining of wetlands, forestlands, grasslands and other open space for agricultural production or urban development decreases or eliminates the capacity of those natural systems to store carbon. The carbon dioxide stored in soil, trees and other vegetation is released into the atmosphere when forestland and open space is converted to other uses. Restoration of these natural areas, and establishment of new ones, has the potential to tie up or sequester greenhouse gas emissions in the form of soil and wood carbon.

This section of Ross' Climate Action Plan highlights carbon sequestration through the restoration and establishment of natural areas, as well as measures to offset the community's greenhouse gas emissions.

Table 5: Section 3.2 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.2.C1	Increase Trees and Vegetation to Achieve a Net Gain of 100 Trees	4
3.2.C2	Offset Emissions from Electricity and Natural Gas Use	412
	TOTAL	416
	% Reduced from 2005 Levels	2.1%

Table 6: Section 3.2 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.2.G1	Increase Public Trees and Vegetation to Achieve a Net Gain of 100 Trees	$100 per tree	n/a	3.8
3.2.G2	Offset Emissions from Electricity and Natural Gas Use	$570 per year	n/a	50.4
3.2.G3	Offset Emissions from Town Vehicles	$870 per year	n/a	66.3
	TOTAL			120.5
	% Reduced from 2005 Levels			50.8%

Recommended Actions

1. Continue to enforce policies and programs that regulate the removal and replacement of significant trees.

2. Support the Street Tree Committee's efforts to develop and implement a community-wide tree planting program for streets and parks to significantly increase the carbon storage potential of trees and other vegetation in the community.

3. To the extent possible, require new development to be planned around existing trees and require new or replacement tree planting as carbon offsets where increased intensity of use, development or activity results in increased GHG emissions.

4. Support the preservation and creation of conservation areas that provide carbon sequestration benefits, such as those with tree cover.

5. Encourage the creation of community gardens, including possible use of surplus Town properties.

6. Achieve further carbon reductions for Town operations by purchasing carbon offsets or participating in programs such as ClimateSmart and TerraPass, after maximizing GHG reductions through conservation, alternative transportation, energy efficiency and renewable energy measures. Consider fiscal impacts of purchasing carbon offsets before participating in these programs.

3.3 Land Use and Transportation

Transportation and land use development are strongly interrelated. The more suburban the development (i.e., low density housing which causes residents to live further from urban centers), the less viable are mass transit systems and other alternative modes of transportation such as walking or biking, and the more dependent residents become on the automobile. Studies have shown that people who live near transit drive between 20 and 40% less and that low-density suburban development generates twice as much GHG emissions per capita than a more dense urban development pattern. As a result, the transportation sector is one of the largest sources of GHG emissions. Though Marin County is known for its environmental consciousness, it is also known for its low-density developments, larger homes, multi-vehicle households, and consumerism. It also ranks among the highest in the U.S. in terms of per capita GHG emissions.

Schools in Marin County also generate a high number of vehicle trips. According to the Transportation Authority of Marin, 21% of all AM peak hour trips are home-to-school trips. While a 2009 Safe Routes to School survey shows 27% of Ross School students walk to school and 15% bike to school, more students could be encouraged to walk or bike to school through safety enhancements and an expanded bike and pedestrian network.

Table 7: Section 3.3 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.3.C1	Encourage Workforce Housing and Transit-oriented Development	25
3.3.C2	Increase Walking and Biking for Local Trips	143
3.3.C3	Increase Public Transit Use	292
3.3.C4	Increase Ridesharing	62
3.3.C5	Accelerate Adoption of Electric Vehicles	146
	TOTAL	669
	% Reduced from 2005 Levels	5.3%

Table 8: Section 3.3 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.3.G1	Replace Town Vehicles with Electric Vehicles	As Replaced	n/a	5.0
3.3.G2	Town Employees Commute by Alternative Means of Transportation	Cost of incentive Chosen	n/a	8.8
3.3.G3	Replace Police Patrol Cars with More Fuel-Efficient Vehicles	As Replaced	$7,000	17.7
	TOTAL			31.6
	% Reduced from 2005 Levels			13.3%

Recommended Actions

1. Reduce GHG emissions through the General Plan and project review processes.
    a. Promote compact and efficient development, such as orienting new development to capitalize on access to public transportation and local services and shopping.
    b. Encourage a "balanced" community, where residents do not have to travel long distances for service needs.
    c. Promote the development of workforce housing for local employees and second units for in-home providers of childcare, healthcare and building and grounds maintenance.
    d. Make reductions in vehicle miles traveled (VMT) and the use of alternative transportation high-priority criteria in the evaluation of policy, program and project alternatives.

2. Encourage bicycling and walking as a safe and efficient means to travel around Ross.
    a. Provide and maintain Class I, II and III bikeways as identified in the Ross Bicycle and Pedestrian Plan.
    b. Improve bicycle and pedestrian safety at intersections and install bicycle loop detectors at signalized intersections to help cyclists trip the traffic signal.
    c. Install traffic calming measures to control speeding and improve pedestrian and cyclist safety.
    d. Implement "Complete Streets" policies to ensure the needs of bicyclists, pedestrians and the disabled are considered in the transportation element of any new capital improvement or development project.
    e. Install sidewalks and pathways where feasible.
    f. Provide bicycle racks and lockers at public destinations and establish bicycle parking requirements for private developments.
    g. Provide bicycle parking at large Town-sponsored events and encourage hosts of large events to do the same.
    h. Encourage employers to provide bicycle parking and shower and changing facilities for employees in their development plans and as a component in all commute and traffic demand management programs.
    i. Promote "Share the Road" strategies to improve bicycle safety and improve compliance with traffic laws.
    j. Participate in programs that encourage bicycling and walking, such as Safe Routes to School programs.

3. Support and promote public transit.
    a. Work with neighboring cities, regional transit providers and the Transportation Authority of Marin to increase both the frequency and types of transit services available to Ross residents, employees and visitors.
    b. Work with transit providers to construct and improve bus shelters at existing bus stops.

4. Support and promote ridesharing and car sharing programs.
    a. Encourage the creation of a system to facilitate informal carpools for Ross commuters.
    b. Promote ridesharing programs, such as SchoolPool Marin and 511 Rideshare.
    c. Work with the County to develop a community car sharing program, when determined to be feasible.

5. Educate residents and employees about the health and environmental benefits of walking, cycling, taking public transit and ridesharing, and provide information to assist in these modes of travel (e.g., information available in public places and employment centers regarding bus schedules, pedestrian pathways, bikeways and ridesharing programs).

6. Support and promote local farmers markets.

7. Encourage the use of fuel-efficient and low GHG-emitting vehicles and driver behaviors.
    a. Encourage private development to provide prioritized parking for hybrid, electric and carpool vehicles.
    b. Adopt and implement a policy requiring limitations on idling for commercial vehicles, construction vehicles, buses and other similar vehicles, beyond state law, where feasible.

8. Purchase or lease low or zero-emissions vehicles and the most fuel efficient models possible for the Town fleet, including police patrol cars and construction vehicles.

9. Provide Town employees with incentives to use alternatives to single occupant auto commuting, such as transit incentives, bicycle facilities, ridesharing services and subsidies, flexible schedules and telecommuting when practical.

10. Increase ownership of plug-in electric vehicles (EV) by providing EV charging station infrastructure, where appropriate, and encouraging property owners and developers to install EV charging stations in commercial and residential projects.

3.4 Green Building, Energy Efficiency And Renewable Energy

The two fundamental means for reducing emissions from electricity and natural gas use are decreasing consumption through efficiency and switching from fossil fuels to renewable sources. According to the U.S. Department of Energy, buildings account for approximately 39% of total energy use, over 12% of the total water consumption, 68% of total electricity consumption, and 38% of all carbon dioxide emissions annually in the United States.

Increasing the efficiency of buildings is the most cost-effective approach for reducing greenhouse gas emissions. Programs which require minimum energy efficiency upgrade for home remodeling, such as increasing insulation and sealing heating ducts, have demonstrated energy savings of up to 20%.

New construction techniques and building materials, known collectively as "green building," can significantly reduce the use of resources and energy and creation of waste in our homes and commercial buildings. Green construction methods can be integrated into buildings at any stage, from design and construction to renovation and deconstruction.

Table 9: Section 3.4 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.4.C1	Improve Energy Efficiency in Existing Residential Buildings	330
3.4.C2	Improve Energy Efficiency in Existing Commercial Buildings	44
3.4.C3	Reduce Energy Use in New Residential Buildings	128
3.4.C4	Reduce Energy Use in New Commercial Buildings	6
3.4.C5	Install Residential Renewable Energy Systems	454
3.4.C6	Install Commercial Renewable Energy Systems	74
	TOTAL	1,036
	% Reduced from 2005 Levels	8.2%

Table 10: Section 3.4 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.4.G1	Install Energy Efficiency Upgrades in Town Buildings	$2,150	$890	1.2
3.4.G2	Upgrade Street Lighting to Energy-efficient Technologies (LED)	n/a	$3,100	10.5
3.4.G3	Upgrade Traffic Signals to Energy-efficient Technologies (LED)	$2,000	$235	0.4
	TOTAL			12.0
	% Reduced from 2005 Levels			5.1%

Recommended Actions:

1. Adopt local amendments to the 2010 California Green Building Standards Code (CALGreen) to extend green building requirements to remodels and additions. Consider amendments that will increase minimum green building standards and energy efficiency requirements, such as requiring buildings to conform to CALGreen Tier 1 and Tier 2 requirements or to third-party rating systems such as Build It Green GreenPoint Rated for residential buildings and LEED for non-residential buildings.

2. Provide incentives to development projects that exceed adopted green building standards.

3. Train existing staff to verify project compliance with green building standards and/or require third-party verification.

4. Develop a town-wide green building promotional campaign. Educate Town staff and policy makers about best practices; provide checklists and specification guidelines for contractors; post green building information on the Town's website.

5. As part of a green building ordinance, require energy efficiency audits for residences and businesses during major remodeling projects.

6. Consider offering an energy audit and informing property owners of recommended energy upgrades at time of property sale inspection.

7. Support efforts of electricity providers to maximize residential and business subscription rates for energy efficiency programs and to promote conservation and renewable energy use.

8. Support efforts of electricity providers to increase the renewable content of the electricity provided to Ross residents and businesses.

9. Consider joining the Marin Energy Authority when an opportunity arises for Ross to become a member of the joint powers authority.

10. If available, participate in a countywide or regional property assessment district financing program to assist homeowners in funding installation of energy efficiency upgrades and renewable energy systems.

11. Adopt policies and incentives to encourage residents and businesses to install solar and renewable energy systems, including solar panels to generate electricity and solar water heating systems, and to construct solar ready buildings.

12. Complete energy efficiency upgrades to Town facilities as recommended by the Marin Energy Management Team.

13. Replace street lights and parking lot lights with energy-efficient technologies, such as LED lighting. Consider potential historical issues before retrofitting street lights.

14. Install photovoltaic panels at Town facilities, if feasible.

15. Design new and remodeled public facilities to meet LEED Silver requirements, or its equivalent, and, at a minimum, to not require any additional energy use over existing facilities.

3.5 Green Purchasing

By adopting environmentally preferable purchasing standards and policies, Ross can measurably reduce its GHG emissions, while benefiting from reduced toxic exposures, pollution prevention, and, in many instances, reduced operating costs. Often, purchases that are environmentally preferable are also fiscally preferable. These include energy star certified appliances, high-efficiency lighting and HVAC units, duplexing printers, and more.

Many durable manufactured goods – from computers to motor vehicles — embody much of the energy used (and carbon emitted) over their life span in their initial production. Optimizing purchasing schedules according to ongoing needs assessment, rather than a fixed replacement schedule, can lower the environmental burden and cost.

Recommended Actions

1. Prioritize purchases of products and services with superior environmental performance and purchase Energy Star-rated office equipment and appliances.

2. Implement operational policies to reduce energy use and conserve resources, such as setting the printer's default option to duplex printing. Continue to shut off computers and imaging equipment at night.

3. Purchase products only when needed and not solely on a replacement schedule.

4. Create an interdepartmental Green Team to review and implement a Green Purchasing Policy & Implementation Plan. Engage Town staff in support and implementation of green purchasing goals and processes.

8. Provide each Town department with an easy reference binder for finding "green" products and distributors.

9. Continue to purchase office paper with 30% recycled content.

Table 11: Section 3.5 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.5.G1	Upgrade to Energy Star-Rated Office Equipment	At time of replacement	$980	1.3
3.5.G2	Switch to 30% Recycled Paper	$420/year	n/a	0.5
	TOTAL			1.8
	% Reduced from 2005 Levels			0.3%

3.6 Waste Reduction, Recycling and Zero Waste

The reduction of waste, as well as the reuse and recycling of products, is key to reducing impacts on the environment. It is necessary to rethink what has traditionally been regarded as garbage and treat all materials as valued resources instead of items to discard. This requires shifting consumption patterns, more carefully managing purchases, and maximizing the reuse of materials at the end of their useful life.

The Town of Ross is a member of the Marin Hazardous and Solid Waste Joint Powers Authority (JPA), which works with private waste haulers and facility operators to implement recycling programs and achieve state-mandated targets for waste diversion rates. Marin County has a high rate of diversion, with a current rate of about 72%.

In 2009, the JPA completed a zero-waste feasibility study which concluded that that between 75% and 80% of the material that goes to the landfill can be diverted. Currently the JPA is targeting the diversion of food waste and demolished building materials to increase the county's diversion rate. The JPA has embraced an aggressive goal for achieving zero waste based upon realizing 80% diversion of waste from disposal by 2012 and achieving zero waste by 2025.

The JPA supports the collection and processing of green waste and food waste to create electricity from methane gas. The waste is processed in anaerobic digesters for soil amendments and the production of biogas. Biogas is the gas produced by anaerobic digestion of organic matter and consists of 60-80% methane (natural gas), 30-40% carbon dioxide, and other trace gases such as hydrogen sulfide, ammonia and hydrogen. The predominance of methane means it can be used as a fuel source.

Table 12: Section 3.6 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.6.C1	Divert All Food Waste from Landfill	138
3.6.C2	Reduce All Other Solid Waste Disposal to Landfills by 25%	103
	TOTAL	241
	% Reduced from 2005 Levels	1.9%

Table 13: Section 3.6 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.6.G1	Reduce Solid Waste Disposal to Landfills by 25%	n/a	n/a	2.3
	% Reduced from 2005 Levels			1.0%

The JPA proposes that the member agencies endorse an Extended Producer Responsibility resolution and sign the California Product Stewardship Council pledge to shift California's product waste management system from one focused on government funded and ratepayer financed waste diversion to one that relies on extended producer responsibility (EPR) in order to reduce public costs and drive improvements in product design that promote environmental sustainability.

Recommended Actions

1. Adopt a policy to achieve zero waste going to landfills.

2. Endorse an Extended Producer Responsibility resolution as proposed by the JPA.

3. Provide education and publicity about reducing waste and available recycling services.

4. Adopt local amendments to the 2010 California Green Building Standards Code to require 50% construction and demolition waste diversion for construction, demolition and renovation projects, as proposed in the JPA's model ordinance.

5. Adopt and enforce a multi-family dwelling and business recycling ordinance.

6. Review and revise the Town's franchise agreement with its waste hauler to ensure waste reduction and diversion rates are maximized.

7. Promote commercial and residential composting.
    a. Partner with Master Gardeners, the Marin Art & Garden Center, and others to provide education and resources to residents on backyard and curbside composting.
    b. Work with Marin Sanitary Service to implement commercial and residential food waste collection in Ross and to create centrally located facilities to compost all green and food waste and process it into biogas.

8. Strengthen recycling programs, purchasing policies, and employee education at Town facilities.

3.7 Water and Wastewater

Water demand in California is increasing because of population expansion. In addition, demand for water for irrigation rises with warmer temperatures. The actual impacts of the climate-induced change in water quality, quantity and demand will depend on the changes in water policy and operations, and on the water use patterns of all communities.

The Marin Municipal Water District (MMWD) supplies clean drinking water to a 147 square-mile area of south and central Marin. MMWD's water comes from three main sources: local reservoirs, the Russian River in Sonoma County and recycled water.

Ross falls within MMWD's jurisdiction and all properties in Ross are subject to the agency's water conservation regulations. The water conservation requirements, particularly irrigation efficiency, are fairly complex, and the Town relies on MMWD to provide technical review and oversight on water conservation and direction in regard to drought-tolerant landscaping. In December 2009, MMWD updated their water efficient landscaping requirements as well as other water conservation measures. These new regulations apply to all newly constructed and rehabilitated non-residential and developer-installed residential landscapes of 2,500 square feet or greater, as well as homeowner residential projects of 5,000 square feet or greater.

In 2007, MMWD adopted a Water Conservation Plan intended to reduce water usage by approximately 9% by 2020. At the end of fiscal year 2009-2010, water usage had fallen 8.7% below 2005 levels. Additional water conservation measures, particularly addressing hot water usage, could further reduce greenhouse gas emissions in Ross.

Recommended Actions

1. Assess, maintain and repair existing plumbing fixtures, pipes and irrigation systems in all Town buildings and facilities to minimize water use, including landscaping. As feasible, upgrade and retrofit agency plumbing and irrigation systems with state-of-the-art water conserving technology.

2. Plant materials native to northern California and Marin County, and encourage the use of drought-tolerant plant material.

Table 14: Section 3.7 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.7.C1	Reduce Water Use in Community by 15%	177
	% Reduced from 2005 Levels	1.4%

3. Minimize turf areas and avoid narrow turf areas, such as in parking strips. Encourage homeowners to avoid turf and replace existing turf areas.

4. Consider water heater upgrade incentives.

5. Conduct water audits on remodels and new homes.

6. Adopt a retrofit program to encourage or require installation of water conservation measures in existing businesses and homes.

7. Provide education about water conservation and available programs and incentives.

8. Allow for the use of grey water for irrigation and other suitable uses to decrease the amount of potable water need by the community.

9. Work cooperatively with MMWD to enforce water conservation requirements and participate in water conservation outreach programs.

3.8 State Actions

The following are state reduction strategies included in the AB 32 Scoping Plan and accounted for in the Town's adjustment of the business-as-usual forecast. To clarify, the State of California has approved, programmed, and/or adopted these actions. Furthermore, they are programs or projects that require no local involvement. Incorporating them into the forecast and reduction assessment provides a more accurate picture of future emissions growth and the responsibility for action.

Low Carbon Fuel Standard

The State is proposing to reduce the carbon intensity of transportation fuels consumed in California. To achieve this, CARB is developing a Low Carbon Fuel Standard (LCFS), which would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 and 20% by 2035 as called for by Governor Schwarzenegger in Executive Order S 01 07. LCFS will incorporate compliance mechanisms that provide flexibility to fuel providers in how they meet the requirements to reduce greenhouse gas emissions. CARB estimates the Low Carbon Fuel Standard will reduce California's projected 2020 transportation emissions by 6.7%.

Table 15: Section 3.8 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.8.C1	PG&E Achieves 33% Renewable Portfolio Standard by 2020	1,136
3.8.C2	AB 1493 Pavley Standards	546
3.8.C3	Low Carbon Fuel Standard	499
	TOTAL	2,181
	% Reduced from 2005 Levels	12.7%

Table 16: Section 3.8 Government Operations Mitigation Measures

Mitigation Measures for Government Operations		
Measure		GHG Emissions Reducted (Metric Tons)
3.8.G1	PG&E Achieves 33% Renewable Portfolio Standard by 2020	16.3
3.8.G2	AB 1493 Pavley Standards	11.4
3.8.G3	Low Carbon Fuel Standard	10.4
	TOTAL	38.1
	% Reduced from 2005 Levels	16.1%

Pavley (AB 1493)

Assembly Bill 1493 (Pavley), signed into law in 2002, will require carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board adopted regulations in September 2004 that create two phases of increasingly stringent standards for car manufacturers between 2009 and 2020. The first phase, which has already been adopted, is expected to reduce California's projected 2020 transportation emissions by 7%.

Renewable Portfolio Standard (RPS)

Established in 2002 in Senate Bill 1078, the RPS program requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and to 33% by 2020. CARB estimates the RPS will reduce California's emissions from electricity use by 15.3% in 2020.

4. PLAN IMPLEMENTATION

Ross recognizes that responding to and preparing for climate change is a critical step toward a sustainable future. The Town's early actions to reduce its contribution to climate change reflect the Town's history and commitment to decrease the impacts of day-to-day activities on the natural environment while enhancing its vibrant quality of life. Mitigating climate change will require everyone — residents, businesses, government agencies and nonprofit organizations — to work together to implement this plan.

This plan provides a strategy to achieve emission reductions that will achieve the Town's target of 15% below 2005 emissions by the year 2020. A wide range of programs that exceed the Town's reduction goal have been included to allow for the evaluation and prioritization of potential programs and capital improvement projects as new program and funding opportunities arise. Successful implementation of the plan will require staff and the Town Council to identify and commit resources to climate change mitigation activities, and to monitor and report on progress towards meeting emissions reduction goals.

Recommended Actions

1. Monitor and report on the Town's progress annually.

2. Update the baseline greenhouse gas emissions inventory every five years, beginning in 2015.

3. Continue and expand public and private partnerships that support implementation of the Climate Action Plan, including membership in the Marin Climate and Energy Partnership.

4. Identify funding sources for recommended actions, and pursue local, regional, state and federal grants as appropriate.

5. Review and update the Climate Action Plan every five years.

6. Amend the Climate Action Plan as necessary to comply with state regulations.

APPENDIX

Data Sources, Assumptions and Calculations

All 2005 greenhouse gas emissions data for community and government operations is from the Town of Ross 2005 Greenhouse Gas Emissions Inventory, with emission factors as follows:

Emission Source	GHG	Emission Factor	Emission Factor Source
PG&E Electricity	CO2	0.489155 lbs/kWh	The certified CO2 emission factor for delivered electricity is publicly available at http://www.climateregistry.org/CarrotDocs/19/2005/2005_PUP_Report_V2_Rev1_PGE_rev2_Dec_1.xls
	CO2e	0.492859 lbs/kWh	PG&E
Default Direct Access Electricity	CO2	343.3 short tons/GWh	ICLEI/Tellus Institute (2005 Region 13 - Western Systems Coordinating Council/ CNV Average Grid Electricity Coefficients)
	CH4	0.035 short tons/GWh	
	N20	0.027 short tons/GWh	
Natural Gas	CO2	53.05 kg/MMBtu	PG&E/CCAR. Emission factors are derived from: California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999 (November 2002); and Energy Information Administration, Emissions of Greenhouse Gases in the United States 2000 (2001), Table B1, page 140.
	CH4	0.0059 kg/MMBtu	CCAR. Emission factors are derived from: U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000" (2002), Table C-2, page C-2. EPA obtained original emission factors from the Intergovernmental Panel on Climate Change, Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (1996), Tables 1-15 through 1-19, pages 1.53-1.57.
	N20	0.001 kg/MMbtu	

Population and household estimates and projections are from the Association of Bay Area Governments, "Projections and Priorities 2009: Building Momentum," August 2009.

3.2 Natural Systems, Sequestration and Carbon Offsets

Measure 3.2.C1: Increase Trees and Vegetation for a Net Gain of 100 Trees

Number of trees	100
Average sequestration per tree	83.52 pounds
Total CO2 sequestered	4 metric tons

Data Source Notes and Assumptions: Average is based on tree species and diameters as listed on the County of Marin's "Trees Native to Marin County." Ordinance #3342, Attachment 1, http://www.co.marin.ca.us/depts/CD/Forms/00000049.pdf. Sequestration data from National Tree Benefit Calculator, www.treebenefits.com.

Measure 3.2.C2: Offset Emissions from Electricity and Natural Gas Use

Projected residential natural gas usage, year 2020	1,041,509 therms
5% natural gas usage reduced through offsets	52,075 therms
GHG emissions offset	278.5 metric tons
Projected residential electricity usage, year 2020	11,403,003 kWh
5% natural gas usage reduced through offsets	570,150 kWh
GHG emissions offset	133.4 metric tons

Data Source Notes and Assumptions: Average is based on tree species and diameters as listed on the County of Marin's "Trees Native to Marin County." Ordinance #3342, Attachment 1, http://www.co.marin.ca.us/depts/CD/Forms/00000049.pdf. Sequestration data from National Tree Benefit Calculator, www.treebenefits.com.

Measure 3.2.G2: Offset Emissions from Electricity and Natural Gas Use

Projected natural gas usage, year 2020	2,738 therms
Natural gas usage reduced through other measures	0 therms
Annual cost to offset natural gas	$179
Projected electricity usage, year 2020	204,201 kWh
Electricity usage reduced through other measures	51,376 kWh
Remaining electricity usage to be offset	152,825 kWh
Annual cost to offset remaining electricity	$388
Total GHG emissions to be offset	50.4 metric tons

Data Source Notes and Assumptions: Assumes participation in PG&E's ClimateSmart program at 2009 costs of $0.06528 per therm and $0.00254 per kWh. PG&E's ClimateSmart program allows customers to balance out the greenhouse gas emissions associated with their own natural gas and electricity use. Under the program, customers who participate are charged an extra $0.06528 per therm of natural gas and $0.00254 per kilowatt-hour (kWh) of electricity, which is the volumetric rate set by the California Public Utilities Commission to make the GHG emissions associated with their home or business energy use "carbon neutral." The revenues

from the program are used solely to invest in new GHG emission reduction projects in California, including forestry, dairy, and landfill methane capture that reduce or absorb GHGs such as carbon dioxide and methane. All of the GHG emission reduction projects are selected through a competitive solicitation with clear and stringent criteria and are independently verified under the rigorous protocols developed by the Climate Action Reserve (CAR), the successor organization to the California Climate Action Registry, to ensure the projects meet the commitment to make participating customers carbon neutral.

Measure 3.2.G3: Offset Emissions from Town Vehicles

Projected Town vehicle emissions in 2020	99.77 metric tons
Emissions offset through other measures	33.48 metric tons
Remaining GHG emissions to offset	66.3 metric tons
Annual cost to offset vehicle emissions	$870

Data Source Notes and Assumptions: Assumes participation in TerraPass program at 2010 cost of $5.95 per 1,000 lbs. TerraPass is a private company that sells carbon offsets to balance vehicle emissions. TerraPass funds three different types of carbon reduction projects: clean energy produced by wind power; landfill gas capture, and methane reduction projects at farms. TerraPass offsets are verified annually against broadly accepted standards by independent third party verifiers. Their primary standards are the latest version of the Voluntary Carbon Standard (issued in 2008) and the Climate Action Reserve.

3.3 Land Use and Transportation

Measure 3.3.C1: Encourage Workforce Housing and Transit-oriented Development

Number of new housing units projected, 2005-2020	20
Number of new housing units in workforce and TOD projected, 2005-2020	12
Vehicle miles traveled (VMT) on local roads, projected 2020	15,067,364 VMT
Number of households, projected 2020	790
Local VMT per household, projected 2020	19,073 VMT
20% reduction in local VMT for transit-oriented units	45,774 VMT
Estimated reduction in GHG emissions	25 metric tons

Data Source Notes and Assumptions: Household projections from the Association of Bay Area Governments, "Projections and Priorities 2009: Building Momentum," August 2009. Number of new housing units and transit-oriented housing units provided by Town of Ross Planning Department; between January 2005 and August 2010, three single family houses and 12 guesthouses and second units had been approved. Local Roads Vehicle Miles Traveled (VMT) 2005 Data: Harold Brazil, Air Quality Associate, Metropolitan Transportation Commission (MTC), as reported in the Town of Ross 2005 Greenhouse Gas Inventory. Projected local VMT based on Travel Forecasts Data Summary: Transportation 2035 Plan for the San Francisco Bay, Metropolitan Transportation Commission, December 2008. Transportation greenhouse gas emissions are based on emission factors as reported in the Town of Ross 2005 Greenhouse Gas Inventory as follows:

Emission Factors: Provided by the BAAQMD, using EMFAC 2007

Area	CO2 Rates (grams/mile)		CH4 Rates (grams/mile)		N2O Rates (grams/mile)	
	Gas	Diesel	Gas	Diesel	Gas	Diesel
Marin County	476	1,426	0.065	0.03	0.07	0.05
BAAQMD Average	463	1,389	0.063	0.03	0.07	0.05

continued:

Area	VMT Mix		CO2 Rates-(grams/gallon)		Fuel Usage		Fuel Efficiency (miles/gallon)	
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel
Marin County	95.50%	4.50%	8,628	9,957	89.20%	10.80%	18.1	7
BAAQMD Average	94.90%	5.10%	8,607	10,091	87.80%	12.20%	18.6	7.3

Measure 3.3.C2: Increase Walking and Biking for Local Trips

Average daily walking and bicycling for utilitarian purposes per adult in Marin	0.67
Estimated annual walking and biking miles traveled in Ross, year 2005	586,920 miles
Increase walking and biking miles traveled by 50% by 2020	293,460 miles
Estimated reduction in GHG emissions (metric tons)(metric tons)	143 metric tons

Data Source Notes and Assumptions: Average daily walking and bicycling data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007. According to this survey data, 11.8% of utilitarian trips in 2007 were made by walking and 1.8% by bicycle, for a total mode share of 13.6%. Estimated annual walking and biking miles in Ross assumes same mileage for children, which were not surveyed due to privacy concerns.

Measure 3.3.C3: Increase Public Transit Use

Average daily transit miles per adult in Marin	1.37
Estimated transit miles traveled in Ross, year 2005	1,200,120 miles
Increase transit miles traveled by 50% by 2020	600,060 miles
Estimated reduction in GHG emissions (metric tons)	292 metric tons

Data Source Notes and Assumptions: Average daily transit data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFE-TEA-LU Section 1807," November 2007. According to this survey data, 3.2% of trips in 2007 were made using public transit. Estimated transit miles traveled in Ross assumes same mileage for children, which were not surveyed due to privacy concerns.

Measure 3.3.C4: Increase Ridesharing

Projected vehicle miles traveled in Ross, year 2020	15,067,364 miles
Ridesharing as a percentage of vehicle miles traveled, year 2007	1.7%
Increase ridesharing miles traveled by 50% by 2020	128,073 miles
Estimated reduction in GHG emissions	62 metric tons

Data Source Notes and Assumptions: Rideshare data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007.

Measure 3.3.C5: Accelerate Adoption of Electric Vehicles

Projected transportation GHG emissions, year 2020	8,166 metric tons
2% of emissions displaced by electric vehicles	163
Electric vehicle VMT, year 2020	301,347
Electric vehicle electricity use	75,337 kWh
Electric vehicle emissions from electricity use	16.8 metric tons
Estimated reduction in GHG emissions	146 metric tons

Data Source Notes and Assumptions: Assumes electric vehicle energy efficiency of 4 miles per kWh, a generally accepted estimate. The 2011 Nissan Leaf, for example, is advertised to have a range of up to 100 miles on full battery charge of 24 kWh, which equates to approximately 4 miles per kWh. This measure counts transportation emissions reductions Ross could achieve by increasing the percentage of EVs in the community fleet 2% over State projections. For a discussion of the electric vehicle market and forecasts, see "Plugged in 2," Deutsche Bank, November 3, 2009, http://www.fullermoney.com/content/2009-11-03/ElectricCarsPluggedIn2.pdf. This report projects U.S. market shares in 2020 of 12% for hybrid electric vehicles, 7% for plug-in hybrid electric vehicles, and 4% for electric vehicles.

Measure 3.3.G1: Replace Town Vehicles with Electric Vehicles

Vehicle	VMT	GHG Emissions (metric tons)	GHG Emissions from Electricity Use (metric tons)	Estimated Reduction in GHG Emissions (metric tons)	kWh
2001 Ford Explorer	11,251	5.65	0.62	5.03	2,813

Data Source Notes and Assumptions: VMT data from Town of Ross 2005 Greenhouse Gas Emissions Inventory background data reports. Assumes electric vehicle energy efficiency of 4 miles per kWh.

Measure 3.3.G2: Town Employees Commute by Alternative Means of Transportation

Employee commute GHG, year 2005	88.4 metric tons
10% reduction	8.8 metric tons

Measure 3.3.G3: Replace Police Patrol Cars with More Fuel-Efficient Vehicles

Patrol car VMT, year 2005	112,154 VMT
Patrol car fuel, year 2005	7,041 gallons
Patrol car GHG emissions, year 2005	62.9 metric tons
Projected fuel reduction, year 2020	2,012 gallons
Projected fuel savings, year 2020	$7,041
Projected GHG emissions reduction, 2020	17.7 metric tons

Data Source Notes and Assumptions: Assumes fuel-efficient patrol cars will be available, such as vehicles currently in development by Carbon Motors. As advertised, these have an ultra low-sulfur, "clean" diesel engine and fuel system that will improve fuel efficiency by up to 40%. Police patrol cars had an average fuel economy of 15.9 mpg in the Ross 2005 Greenhouse Gas Emissions Inventory. The Carbon Motors vehicle will have a combined city/highway fuel economy of 28-30 mpg. This analysis assumes a 40% improvement in fuel economy for an average 22.3 mpg. Projected fuel savings assumes an average fuel cost of $3.50 per gallon.

3.4 Green Building, Energy Efficiency and Renewable Energy

Measure 3.4.C1: Improve Energy Efficiency in Existing Residential Buildings

Number of occupied households, year 2005	770
Electricity use in residential sector, year 2005	11,403,003 kWh
GHG emissions from residential sector, year 2005	8,239 metric tons
Expected energy efficiency achieved	20%
Potential energy efficiency upgrade penetration	20%
Number of housing units improved	154
Estimated reduction in electricity use	456,120 kWh
Estimated GHG reduction in electricity use	107 metric tons
Total estimated GHG reduction	330 metric tons

Measure 3.4.C2: Improve Energy Efficiency in Existing Commercial Buildings

GHG emissions from commercial sector, year 2005	1,102 metric tons
Electricity use in commercial sector, year 2005	2,361,007 kWh
Expected energy efficiency achieved	20%
Potential energy efficiency upgrade penetration	20%
Estimated reduction in electricity use	94,440 kWh
Estimated GHG reduction in electricity use	23 metric tons
Total estimated GHG reduction	44 metric tons

Measure 3.4.C3: Reduce Energy Use in New Residential Buildings

Projected number of new homes and substantial remodels, 2005-2020	60
Average residential electricity use per household, year 2005	14,809 kWh
Average residential GHG emissions per household, 2005	10.7 metric tons
15% reduction in electricity use due to CA 2008 Building Efficiency Standards 2010-2020	88,855 kWh
Additional 15% reduction from Marin Green BERST Standards 2010- 2020	88,855 kWh
Estimated reduction in electricity use	177,709 kWh
15% reduction in energy use due to CA 2008 Building Efficiency Standards 2010-2020	64 metric tons
Additional 15% reduction from Marin Green BERST Standards 2010- 2020	64 metric tons
Estimated GHG reduction	128 metric tons

Data Source Notes and Assumptions: According to the CEC, the 2008 Building Efficiency Standards, which took effect on January 1, 2010, require, on average, a 15% increase in energy efficiency savings compared with the 2005 Building Efficiency Standards. California Energy Commission, 2009 Integrated Energy Policy Report, Final Commission Report, December 2009, CEC -100-2009-003-CMF, p.5. Marin Green BERST recommends an additional reduction from existing Title 24 Part 6 energy budget requirements for new single and two-family residential construction as follows: 500-3,999 sq. ft., 15%; 4,000 – 5,499 sq. ft., 20%; 5,500 – 6,999 sq. ft., 30%; over 7,000 sq. ft., net zero energy. The Marin Green BERST recommendation for new multi-family buildings is 15% below Title 24 energy budget requirements. This analysis assumes an average 15% across all residential building types.

Measure 3.4.C4: Reduce Energy Use in New Commercial Buildings

Projected increase in GHG emissions in commercial sector 2005-2020	38 metric tons
Projected increase in electricity use in commercial sector 2005-2020	82,361 kWh
15% reduction in electricity use due to CA 2008 Building Efficiency Standards 2010-2020	8,236 kWh
Additional 10% reduction from Marin Green BERST Standards 2010- 2020	5,491 kWh
Estimated reduction in electricity use	13,727 kWh
15% reduction in energy use due to CA 2008 Building Efficiency Standards 2010-2020	3.8 metric tons
Additional 10% reduction from Marin Green BERST Standards 2010-2020	2.6 metric tons
Estimated GHG reduction	6.4 metric tons

Data Source Notes and Assumptions: According to the CEC, the 2008 Building Efficiency Standards, which took effect on January 1, 2010, require, on average, a 15 percent increase in energy efficiency savings compared with the 2005 Building Efficiency Standards. California Energy Commission, 2009 Integrated Energy Policy Report, Final Commission Report, December 2009, CEC -100-2009-003-CMF, p.5. Marin Green BERST recommends an additional 15% reduction from existing Title 24 Part 6 energy budget requirements for new commercial construction over 5,000 sq. ft. This analysis assumes an average 10% reduction across all commercial building sizes.

Measure 3.4.C5: Install Residential Renewable Energy Systems

Annual electricity use in residential sector, year 2005	11,403,003 kWh
GHG emissions from residential electricity use, year 2005	2,668 metric tons
Number of households in 2005	770
Average annual residential energy use	14,809 kWh
% potential solar energy of total electricity use	85%
Potential solar system penetration	20%
Potential number of homes	154
Estimated electricity saved	1,938,511 kWh
Estimated GHG reduction	454 metric tons

Data Source Notes and Assumptions: Number of Ross households in 2005 is based on estimates provided by the Association of Bay Area Governments (ABAG) Projections 2009. As of 8/25/10, Ross has 24 installed residential systems and a total capacity of 134 kW or approximately 5.6 kW per system (Marin Energy Management Team and California Solar Initiative data). This number represents 2.9% of the existing 827 single family homes in Ross. Solar installation in Ross has occurred at a much greater rate than California (0.4%) and Marin County (1.1%). SunRun, a local solar system financing company, estimates that nearly one-third of Ross houses, or about 276 houses, are good candidates for solar.

Measure 3.4.C6: Install Commercial Renewable Energy Systems

Annual electricity use in commercial sector in 2005	2,361,007 kWh
GHG emissions from commercial electricity use in 2005	581 metric tons
% potential solar energy of total electricity use	85%
Potential solar system penetration	15%
Estimated electricity saved	301,028 kWh
Estimated GHG reduction	74 metric tons

Data Source Notes and Assumptions: As of 8/25/10, Ross has 3 installed non-residential systems at The Branson School for a total capacity of 81 kW and an estimated annual electricity production of 116,497 kWh (Marin Energy Management Team and California Solar Initiative data).

Measure 3.4.G1: Install Energy Efficiency Upgrades in Town Buildings

Energy-Efficiency Project	Reduction in Annual Electricity Use (kWh)	Estimated Project Cost	Annual Energy Cost Savings	Reduction in GHG emissions (metric tons)
Install energy-efficient lighting in Town buildings	3,193	$2,145	$548	0.71
CPU Power Management	2,000	Completed	$343	0.45
TOTAL	5,193	$2,145	$891	1.16

Data Source Notes and Assumptions: Proposed energy-efficiency projects and estimated project costs, net of rebates, based on preliminary Energy Management Studies prepared by the Marin Energy Management Team on March 12, 2009. Annual electricity cost savings based on an average of summer and winter rate of .17115 per kWh from PG&E's A-1 Electric Rate Schedule, effective June 1, 2010. Annual natural gas cost savings based on PG&E's G-NR1 Schedule for Gas Service to Small Commercial Customers, effective May 1, 2010.

Measure 3.4.G2: Upgrade Street Lighting to Energy-Efficient Technologies: LED Retrofit

Ross-Owned Street Lights

Lamp Type	Quantity	Annual Energy Use (kWh)	Annual Operating Cost	GHG Emissions (metric tons)	Potential Replacement Lamp	Annual Energy Use (kWh)	Annual Operating Cost	GHG Emissions (metric tons)	Replacement Cost	Reduction in Annual Energy Use (kWh)	Reduction in Annual Operating Cost	Reduction in GHG Emissions (metric tons)
Incandescent 189w	16	12,480	$1,555	2.79	CFL 23w	1,478	$503	0.33	$0	11,002	$1,052	2.46
HPS 200w	1	972	$121	0.22	LED 117w	481	$61	0.11	$801	491	$60	0.11
SUBTOTAL	17	13,452	$1,676	3.01		1,959	$564	0.44	$801	11,493	$1,111	2.57

PG&E-Owned Street Lights

Lamp Type	Quantity	Annual Energy Use (kWh)	GHG Emissions (metric tons)	Potential Replacement Lamp	Annual Energy Use (kWh)	GHG Emissions (metric tons)	Reduction in Annual Energy Use (kWh)	Reduction in GHG Emissions Reduction (metric tons)
Mercury Vapor 100w	32	15,360	3.43	LED 60w	8,218	1.84	7,142	1.60
HPS 70w	60	20,880	4.67	LED 47w	11,664	2.61	9,216	2.06
HPS 100w	2	984	0.22	LED 60w	514	0.11	470	0.11
HPS 150w	6	4,320	0.97	LED 99w	2,398	0.54	1,922	0.43
HPS 200w	18	17,496	3.91	LED 117w	8,662	1.94	8,834	1.97
Incandescent 58w	76	18,240	4.08	LED 47w	14,774	3.30	3,466	0.77
Incandescent 92w	37	13,764	3.08	LED 60w	9,502	2.12	4,262	0.95
SUBTOTAL	231	91,044	20.35		55,730	12.46	35,314	7.89

TOTALS	248	104,496	23.36		57,689	12.90	46,807	10.46

Data Source Notes and Assumptions: Potential replacement lamps and estimated installation costs provided by Republic ITS for illustrative purposes only; actual replacement lamps will require further analysis. Annual energy usage and costs based upon PG&E's LS-2 Electric Schedule for customer-owned street and highway lighting, effective of June 1, 2010, and PG&E's LS-1 Electric Schedule for PG&E-owned street and highway lighting, effective June 1, 2010.

Measure 3.4.G3: Upgrade Traffic Signals to Energy-Efficient Technologies: LED Retrofit

Signal Type	Quantity	Existing Lamp (watts)	Annual Energy Use (kWh)	Annual Energy Cost	GHG Emissions (metric tons)	Proposed Replacement LED Lamp (watts)	Annual Energy Use (kWh)	Annual Energy Cost	GHG Emissions (metric tons)	Installation Cost	Reduction in Annual Energy Use (kWh)	Annual Energy Cost Savings	Reduction in GHG Emissions (metric tons)
8" Yellow Balls	12	69	1,813	$246	0.41	7.7	202	$27	0.05	$1,200	1,611	$218	0.36
16" Pedestrian Signals	4	14.5	508	$69	0.11	11	385	$52	0.09	$800	123	$17	0.03
TOTAL			2,321	$314	0.52		588	$80	0.13	$2,000	1,734	$235	0.39

Data Source Notes and Assumptions: Existing and proposed lamp types, wattages, energy usage and estimated installation costs provided by Republic ITS. Annual energy costs based upon PG&E's TC-1 Schedule for traffic control service, effective March 1, 2010. Installation costs are expected to be paid for by a federal Highway Safety Improvement Program grant awarded to the Town in 2009.

3.5 Green Purchasing

Measure 3.5.G1: Upgrade to Energy Star-Rated Office Equipment

Equipment	Quantity	Estimated Annual Energy Savings Per Unit (kWh)	Annual Energy Savings (kWh)	Annual Energy Cost Savings	Reduction in GHG Emissions (metric tons)
Monitor	5	18	90	$15	0.02
Computer CPU	5	49	245	$42	0.05
Imaging Equipment	10	12	120	$21	0.03
TOTAL			455	$78	0.10

Data Source Notes and Assumptions: Estimated energy savings based upon energy savings calculators developed by the U.S. Environmental Protection Agency and U.S. Department of Energy and available at www.energystar.gov. For estimating purposes, computers and monitors were assumed to have sleep settings activated and to be turned off at night. Annual electricity cost savings are based on an average of summer and winter rates of .17115 per kWh from PG&E's A-1 Electric Rate Schedule, effective June 1, 2010.

Measure 3.5.G2: Switch to 30% Recycled Paper

Paper purchased per year	180 reams
Paper weight	900 pounds
Paper cost @ $36 per case	$648
30% recycled paper cost @ $43 per case	$774
Additional cost	$126
GHG emissions reduction	443 pounds
GHG emissions reduction	0.20 metric tons

Data Source Notes and Assumptions: GHG emissions reduction estimates were made using the Environmental Defense Fund Paper Calculator at www.papercalculator.org.

3.6 Waste Reduction, Recycling and Zero Waste

Measure 3.6.C1: Divert All Food Waste from Landfill

Projected waste in year 2020	3,441 tons
Food waste in year 2020; 14.6% of total	502 tons
GHG emissions reduced	138 metric tons

Data Source Notes and Assumptions: Estimated food waste based on the CIWMB 2004 Statewide Waste Characterization Study. This state average waste characterization accounts for residential, commercial and self-haul waste. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

CACP	CIWMB	% of Total	Methane Emissions (metric tons / short ton of waste)
Paper Products	All paper types	21	1.940
Food Waste	Food	14.6	1.098
Plant Debris	Leaves and Grass, Prunings and Trimmings, Branches and Stumps, Agricultural Crop Residues, and Manures	6.9	0.622
Wood/Textiles	Textiles, Remainder/Composite Organics, Lumber, and Bulky Items	19.8	0.549
All Other Waste	The other category includes all inorganic material types reported: Glass, Metal, Electronics, Plastics, Non-organic C&D, and Special/ Hazardous Waste.	37.7	0.000

The 75% methane recovery factor is derived from the Local Government Operations Protocol, Chapter 9. The methane emission factors used in ICLEI's CACP Software were derived from the EPA WARM model. For quantification of emissions, only methane generation (or gross emissions) is taken into account. These emissions are estimated to take place over an extensive (up to 100 year) cycle, as anaerobically degradable organic carbon decomposes in a landfill. More information on the WARM Model is available at: http://epa.gov/climatechange/wycd/waste/calculators/Warm_home.html

Measure 3.6.C2: Reduce All Other Solid Waste Disposal to Landfills by 25%

Projected waste in year 2020	3,441 tons
Food waste diverted	502 tons
Remaining landfilled waste in year 2020	2,939 tons
GHG emissions from remaining waste	411 metric tons
25% reduction in remaining waste	103 metric tons

Measure 3.6.G1: Reduce Solid Waste Disposal to Landfill by 25%

Projected waste in 2020	36.8 tons
GHG emissions from waste in 2020	9.3 metric tons
25% reduction in GHG emissions	2.3 metric tons

Data Source Notes and Assumptions: Waste Characterization based on California Integrated Waste Management Board (CIWMB), derived specifically for the "Public Administration" sector, using the Business Waste Characterization portion of the CIWMB 1999 Statewide Waste Characterization Study: http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asp

CACP	CIWMB	Percent of Total
Paper Products	All paper types	39.4
Food Waste	Food	9.8
Plant Debris	Leaves and Grass, Prunings and Trimmings, Branches and Stumps, Remainder/Composite Organic	17
Wood/Textiles	Textiles (Under "Other Organic"), Lumber (Under "Construction and Demolition"), Remainder/Composite Construction and Demolition	6.7
All Other Waste	The other category includes all inorganic material types reported: Glass, Metal, Electronics, Plastics, Non-organic C&D, and Special/Hazardous Waste.	27.1

3.7 Water and Wastewater

Measure 3.7.C1: Reduce Water Use in Community by 15%

Per capita water use per day, FY 05/06	139 gallons
Water use in 2005	121,764,000 gallons
Projected water use in 2020	121,764,000 gallons
Indoor, hot water use	24,474,564 gallons
15% reduction in hot water use	3,671,185 gallons
Reduction in natural gas use	20,867 therms
Reduction in electricity use	292,961 kWh
Estimated reduction in GHG emissions	177 metric tons

Data Source Notes and Assumptions: Per capita water use in Marin Municipal Water District FY 2005/2006 was 139 gallons per day, MMWD Report on Water Production and Related Statistics, June 30, 2008, p.12. Indoor water use assumed to be 67% of total water use (Dan Carney, MMWD) and hot water use 30% of indoor water use (EBMUD Indoor Water Conservation Study (p. 31), 2003; see http://www.ebmud.com/about_ebmud/publications/technical_reports/residential_indoor_wc_study.pdf) Analysis assumes 0.0098 therms to heat one gallon of water, 0.19 kWh to heat one gallon of water, and 58% of hot water heaters use natural gas (ICLEI CAPPA Beta).

3.8 State Actions

Measure 3.8.C1: PG&E Achieves 33% Renewable Portfolio Standard by 2020

Projected community electricity use in year 2020	13,846,371 kWh
Electricity use reduced from other measures	3,274,496 kWh
Electricity use added back for electric vehicles	75,337 kWh
Remaining electricity usage	10,647,212 kWh
GHG emissions with year 2005 PG&E emission factor	2,380 metric tons
GHG emissions with projected year 2020 PG&E emission factor	1,244 metric tons
Estimated reduction in GHG emissions	1,136 metric tons

Data Source Notes and Assumptions: Projected 2020 PG&E CO2e emission factor of 0.25763 is based on PG&E's 2005 electric power mix as follows: 12% from renewable sources; 20% from large hydro; 24% from nuclear; 42% from natural gas; 1% from coal; and 1% from other GHG-emitting sources. Analysis assumes additional 21% renewable energy will displace GHG-emitting sources in the electric power mix. Many variables will affect the actual 2020 emission factor, including the availability of large hydro and nuclear electricity sources, and the GHG reduction potential calculated here assumes conditions will be similar to 2005.

Measure 3.8.C2: AB 1493 Pavley Standards

California transportation emissions, year 2020	225.4 MMTCO2e
Expected reduction in emissions under phase one	16.4 MMTCO2e
% reduction	7.28%
Local community transportation emissions, projected year 2020	8,166 metric tons
GHG emissions reduced by other measures	669 metric tons
Remaining GHG emissions	7,498 metric tons
Estimated reduction in GHG emissions	546 metric tons

Data Source Notes and Assumptions: California Air Resources Board, "Climate Change Scoping Plan: A Framework for Change," December 2008, p. 13. California Air Resources Board, "Comparison of Greenhouse Gas Reductions for the United States and Canada under U.S. CAFE standards and California Air Resources Board Greenhouse Gas Regulations," Feb. 25, 2008, p. 13, http://www.energy.ca.gov/2008publications/ARB-1000-2008-012/ARB-1000-2008-012.PDF.

Measure 3.8.C3: Low Carbon Fuel Standard

California transportation emissions, year 2020	225.4 MMTCO2e
Expected reduction in emissions	15 MMTCO2e
% reduction	6.65%
Community transportation GHG emissions, projected year 2020	8,166 metric tons
GHG emissions reduced by other measures	669 metric tons
Remaining GHG emissions	7,498 metric tons
Estimated GHG emissions reduction	499 metric tons

Data Source Notes and Assumptions: California Air Resources Board, "Climate Change Scoping Plan: A Framework for Change," December 2008, pp. 13 and 17.

Measure 3.8.G1: PG&E Achieves 33% Renewable Portfolio Standard by 2020

Projected government electricity use in year 2020	204,201 kWh
Electricity use reduced from other measures	54,188 kWh
Electricity use added back for electric vehicles	2,813 kWh
Remaining electricity usage	152,825 kWh
GHG emissions with year 2005 PG&E emission factor	34.17 metric tons
GHG emissions with projected year 2020 PG&E emissions factor	17.9 metric tons
Estimated reduction in GHG emissions	16.3 metric tons

Measure 3.8.G2: AB 1493 Pavley Standards

California transportation emissions, year 2020	225.4 MMTCO2e
Expected reduction in emissions under phase one	16.4 MMTCO2e
% reduction	7.28%
Local government transportation emissions, year 2020	188.2 metric tons
GHG emissions reduced by other measures	31.6 metric tons
Remaining GHG emissions	156.6 metric tons
Estimated reduction in GHG emissions	11.4 metric tons

Measure 3.8.G3: Low Carbon Fuel Standard

California transportation emissions, year 2020	225.4 MMTCO2e
Expected reduction in emissions	15 MMTCO2e
% reduction	6.65%
Local government transportation emissions, year 2020	188.2 metric tons
GHG emissions reduced by other measures	31.6 metric tons
Remaining GHG emissions	156.6 metric tons
Estimated reduction in GHG emissions	10.4 metric tons

Measure 3.8.G2: AB 1493 Pavley Standards

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e under phase one	16.4
% reduction	7.28%
2020 government transportation emissions (metric tons)	333.8
GHG emissions reduced by other measures (metric tons)	34.4
Remaining GHG emissions (metric tons)	299.4
Estimated reduction in GHG emissions (metric tons)	21.8

Measure 3.8G3: Low Carbon Fuel Standard

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e	15
% reduction	6.65%
2020 government transportation emissions (metric tons)	333.8
GHG emissions reduced by other measures (metric tons)	34.4
Remaining GHG emissions (metric tons)	299.4
Estimated reduction in GHG emissions (metric tons)	19.9